

Urban Dynamics—Analyzing Land Use Change in Urban Environments

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In FY99, the Earth Resource Observation System (EROS) staff at Ames continued managing the U.S. Geological Survey's (USGS) Urban Dynamics Research program, which has mapping and analysis activities at five USGS mapping centers. Historic land use reconstruction work continued while activities in geographic analysis and modeling were expanded.

Retrospective geographic information system (GIS) development—the spatial reconstruction of a region's urban land-use history—focused on the Detroit River Corridor, California's Central Valley (see figure 1), and the city of Sioux Falls, South Dakota. The Detroit River study is in collaboration with staff at the USGS Great Lakes Science Center in Ann Arbor, Michigan. The spatial history of land-use change and shoreline development was constructed in order to assess the human pressures that have affected the Detroit River ecosystem. Land-use change will be correlated with losses of fish and wildlife habitat along the river. The growing concern over the effects of sprawl and unchecked urbanization in California's Central Valley initiated a preliminary assessment of urban growth over time. The data were used to help decision-makers in educating the public regarding future growth and environmentally sustainable economic growth in the valley. The Sioux Falls, South Dakota, study was undertaken to examine the development patterns of a typical Midwestern city unrestrained by hydrologic or physiographic features. The transportation network and the extent of developed land were reconstructed for eight time periods. Regional planners and local educators will use the data to increase public awareness.

Geographic analysis work focused on the comparative analysis of urban land-use change for six selected cities. Population totals, area summaries, rates of change, historical events, and spatial patterns were compiled and are undergoing statistical analysis.

Modeling activities involved the continued collaboration with researchers at the University of California, Santa Barbara (UCSB), and the Environmental Protection Agency in modeling urban growth and land-use change in the Mid-Atlantic region. Additional funding from the National Science Foundation (NSF) initiated work between UCSB, USGS, and the Los Alamos National Laboratory in the development of an integrated environment for modeling urban growth.

EROS/Ames staff initiated a new project working together with local county planners and conservation groups in California's Central Valley to develop an integrated environment of data, scientific information, analyses, predictive models, advanced visualization techniques and decision support tools for improving the way scientific information is used in local decision making.

Collaborators in this research include Keith Clarke (University of California at Santa Barbara), Dave Hester (U.S. Geological Survey), Steen Rasmussen (Los Alamos National Laboratory), Bruce Manny (U.S. Geological Survey), and Carol Whiteside (Great Valley Center).

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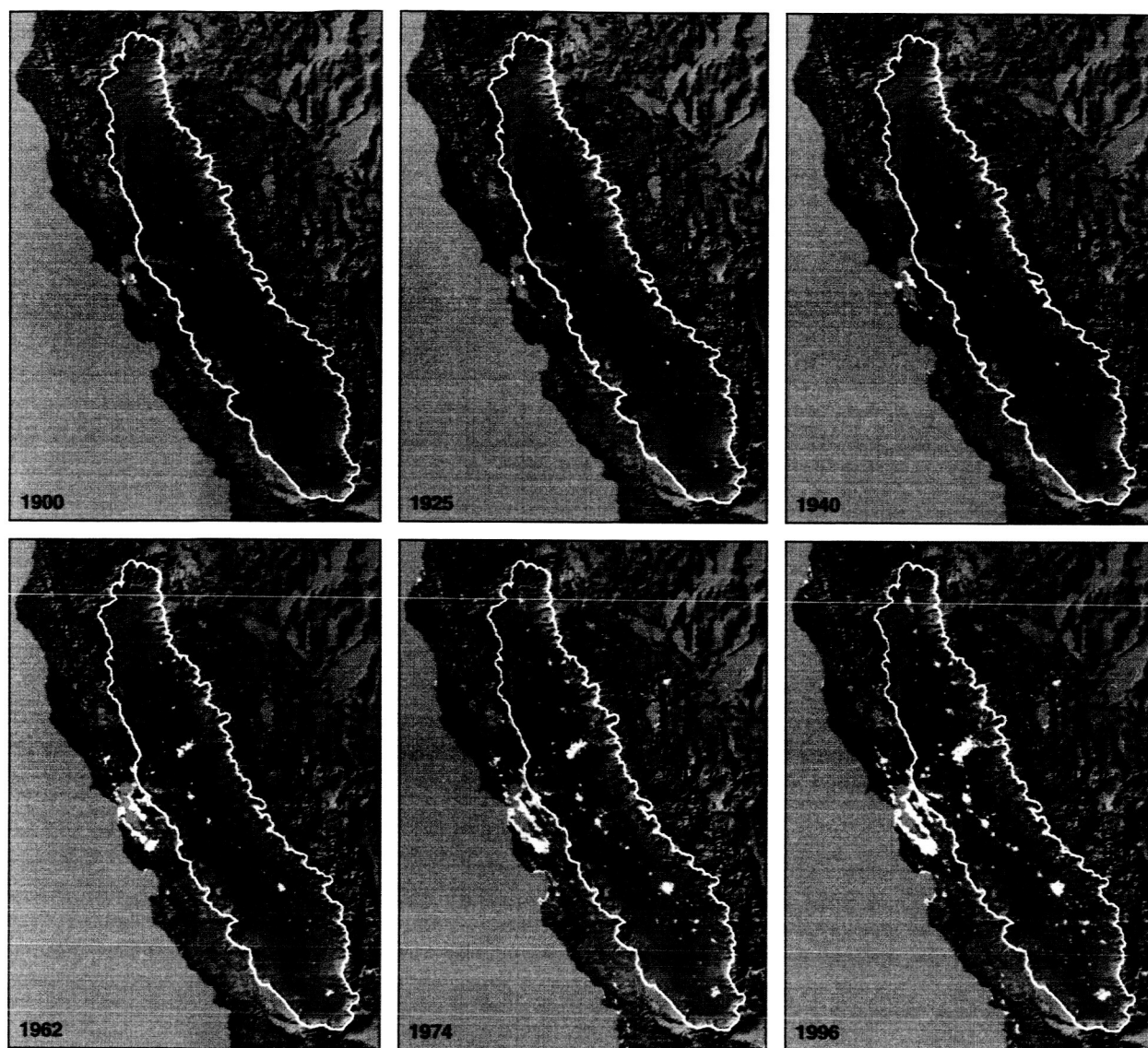


Fig. 1. Historical maps, remotely sensed imagery, and related farmland mapping surveys were used to reconstruct this temporal view of urban growth in California's Central Valley and the adjacent San Francisco Bay area. The Central Valley has a population of more than 5 million, a number that is projected to triple by 2040. The American Farmland Trust, a national organization that works to preserve agricultural lands, estimates that more than a million acres of Central Valley farmland will be lost to urbanization by 2040 if current growth patterns continue. Research on land-use change in the Central Valley will enhance the understanding of urban growth and its effects on people, the landscape, and the economy.